Dynamic and social behaviors of human pluripotent stem cells.

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Public Summary:
Human pluripotent stem cells (hPSCs) can self-renew or differentiate to diverse cell types, thus providing a platform for basic and clinical applications. However, pluripotent stem cell populations are heterogeneous and functional properties at the single cell level are poorly documented leading to inefficiencies in differentiation and concerns regarding reproducibility and safety. Here, we use non-invasive time-lapse imaging to continuously examine hPSC maintenance and differentiation and to predict cell viability and fate. We document dynamic behaviors and social interactions that prospectively distinguish hPSC survival, self-renewal, and differentiation. Results highlight the molecular role of E-cadherin not only for cell-cell contact but also for clonal propagation of hPSCs. Results indicate that use of continuous time-lapse imaging can distinguish cellular heterogeneity with respect to pluripotency as well as a subset of karyotypic abnormalities whose dynamic properties were monitored.

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